

Operating Parameters

SUNNY BOY 8000TLUS / 9000TLUS / 10000TLUS

Technical Description



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SMA America Production, LLC
3801 N. Havana Street
Denver, CO 80239 U.S.A.

IMPORTANT SAFETY INSTRUCTIONS Sunny Boy Inverter

SAVE THESE INSTRUCTIONS

This manual contains important instructions for Sunny Boy inverter, that shall be followed during installation and maintenance of the inverter.

The Sunny Boy is designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the Sunny Boy. To reduce the risk of personal injury and to ensure the safe installation and operation of the Sunny Boy, you must carefully read and follow all instructions, cautions and warnings in this technical description.

Warnings

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.



DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation that can result in property damage if not avoided.

Other Symbols

In addition to the safety and hazard symbols described on the previous pages, the following symbol is also used in this technical description:



Information

This symbol accompanies notes that call attention to supplementary information that you should know and use to ensure optimal operation of the system.

Markings on this Product

The following symbols are used as markings on this product with the following meanings.



Warning regarding dangerous voltage

The product works with high voltages. All work on the product may only be done as described in its documentation.



Beware of hot surface

The product can become hot during operation. Avoid coming into contact with the product during operation.



Observe the operating instructions

Read the product's documentation before working on it. Follow all safety precautions and instructions as described in the documentation.



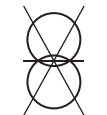
UL1741 is the standard applied by Underwriters Laboratories to the Sunny Boy to certify that it meets the requirements of the NEC and IEEE-929-2000. IEEE 929-2000 provides recommendations regarding the proper equipment and functionality necessary to ensure compatible operation when power generation is connected to the utility grid.



AC current



DC current



Transformerless



Earth Ground



UL1741 is the standard applied by Underwriters Laboratories to the Sunny Boy to certify that it meets the requirements of the NEC and IEEE-929-2000. IEEE 929-2000 provides recommendations regarding the proper equipment and functionality necessary to ensure compatible operation when power generation is connected to the utility grid.

General Warnings



General Warnings

The Sunny Boy contains no user-serviceable parts except for the fans on the bottom of the enclosure and the filters behind the fans as well as the handle covers on the sides of the unit. For all repair and maintenance always return the unit to an authorized SMA Service Center.

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1 Notes on this Manual

1.1 Area of Validity

In this document you will find the description and meaning of the operating parameters of the following SMA inverters:

- Sunny Boy 8000TLUS (SB 8000TLUS-10)
- Sunny Boy 9000TLUS (SB 9000TLUS-10)
- Sunny Boy 10000TLUS (SB 10000TLUS-10)

1.2 Target Group

This manual is for qualified personnel and the operator of the Sunny Boy. Activities that have to be done by qualified personnel, are marked with a safety warning.

- Qualified personnel

Qualified personnel has received training and has demonstrated skills and knowledge in the construction and operation of the device. Qualified personnel has received training to recognize and avoid the hazards involved.

- Operator

The operator has been adequately supervised by qualified personnel to ensure a safe use of the Sunny Boy.

1.3 Additional Information

You will find information on the mounting, installation, commissioning and maintenance of the inverter as well as device-specific technical data in the installation guide of the respective inverter. You will find information on the operation of the inverter in the user manual for the Sunny Boy.

2 Explanation of the Operating Parameters

The various operating parameters control the functionality of the Sunny Boy. They can only be viewed and changed via a communication device or communication software.

grayed-out parameters Some parameters can only be viewed by an installer. The so-called "installer password" is required for this. Only the installer can change parameters.



You can see the default settings of the inverter in the specifications on the type plate.

Name	Description
CO2-Fact	The Sunny Boy evaluates the yield and indicates the approximate CO2 emission avoided by your Sunny Boy. The amount of CO2 avoided is computed according to the kWh produced (E-total) multiplied by the factor defined in the parameter "CO2".
Default	Used for adjusting the parameters country specific settings. Note: After changing one of the parameteres marked with " ** ", the parameter "Default" changes to "adjusted" automatically.
E_Total	Total energy yield of the inverter. Changing the value can be necessary when a Sunny Boy is exchanged and you wish to match the previously acquired data.
Fac-delta -	Maximum permissible frequency deviation (frequency increase protection and frequency drop protection) above (Fac-delta+) and below (Fac-delta-) the grid frequency of 60 Hz can be, before the grid monitoring system disconnects the device from the grid.
Fac-delta+	
Fac-MinTripTime	Utility interconnection frequency trip time. Default value is optimal for installations < 30 kW.
Fac-Limit delta	For setting the frequency-dependent output derating in the operating mode "OFF Grid". More information on this subject can be found in the Sunny Island technical description.
Fac-Start delta	
Fan-Test	By setting this parameter to "1" you can check the function of the fans. This test turns the fans at maximum speed.
h_Total	Total hours of operation of the inverter. A change may be necessary when you exchange your Sunny Boy and want to use the data from the old device.
Memory Function	Default param.: Sets all parameters to default. Reset Op.Data: Sets all parameters that are visible in user level to default values. Reset errors: Resets all permanent device disable errors.

Name	Description
Operating Mode	Operating Modes of the Sunny Boy: MPP-Operation: Sets the Sunny Boy in Maximum Power Point Tracking Mode V-const: Constant Voltage Mode (Setpoint defined in "Vconst-Setval") Stop: Disconnection from utility, no operation
Plimit	Upper limit of AC output power (fixed).
Pmax	Active power limitation of the inverter.

Name	Description
PowerBalMax	Parameter for limiting the maximum output of an inverter. The output limitation can be set to the maximum permissible unbalanced load that depends on the specifications of the grid operator. PowerBalMax has four operating modes: Off: • PowerBalMax is deactivated. • In the event of a device disturbance or grid voltage fault of an inverter, only the affected inverter is disconnected from the grid. • The remaining devices continue to operate without reducing their output. PowerGuard: • Operating mode in which no distinction is made between a device disturbance and a grid voltage fault. • The affected device disconnects from the grid. • The remaining inverters limit their output over a 10 minute average. PhaseGuard: • Operating mode in which a distinction is made between a device disturbance and a grid voltage fault. • In case of a device disturbance at the first Sunny Boy, the remaining inverters will continue to operate without reducing their output. • In case of a grid voltage disturbance, all devices will immediately disconnect from the grid. FaultGuard: • Operating mode in which a distinction is made between a device disturbance and a grid voltage fault. • In the event of a device disturbance, the fault message is sent to the remaining devices with a time lapse of 5 minutes. • After the 5 minutes have passed, the remaining devices will disconnect from the grid as well. • In the event of a grid voltage fault, all devices immediately disconnect from the grid.
Riso-Min	This parameter is used to change the threshold value for the insulation monitoring. The parameter cannot be permanently saved.
SMA-SN	Serial Number of the Sunny Boy (fixed).
Software-BFR	Firmware version of the operation control unit (BFR) (fixed)

Name	Description
T-Start	The time the inverter waits to connect to the grid after Vpv-Start is exceeded. This value defaults to 5 minutes after a utility fault.
T-Stop	The time that the Sunny Boy waits to disconnect from the grid when the DC voltage falls below minimum necessary Vpv.
V-Const Setval	PV Setpoint voltage for constant voltage operation. These parameters only are important in case the parameter "Operating Mode" is set to "V-const".
Vac-Min	Values are used to calculate the lower limit of allowable AC voltage. Default value is optimal for installations < 30 kW. The default 12 results in a trip value of 88 % as listed under trip limits.
Vac-Max	Values are used to calculate the upper limit of allowable AC voltage. Default value is optimal for installations < 30 kW. The default 10 results in a trip value of 110 % as listed under trip limits.
Vac-Min-Fast	Values are used to calculate the lower limit of allowable AC voltage for fast disconnection. Default value is optimal for installations < 30 kW. The default 50 results in a trip value of 50 % as listed under trip limits.
Vac-Max-Fast	Values are used to calculate the upper limit of allowable AC voltage for fast disconnection. Default value is optimal for installations < 30 kW. The default 20 results in a trip value of 120 % as listed under trip limits.
Vac-Min-Recnct	Values are used to calculate the lower and upper limits to reconnect to the grid after a grid failure.
Vac-Max-Recnct	
Vpv-Start	Minimum DC voltage for the Sunny Boy to connect to the grid. This value is above the minimum MPP voltage which is required in order to always guarantee safe connection to the grid, and to minimize grid relay wear. If, after disconnection from the grid, and in the absence of any further faults, the inverter does not automatically reconnect to the grid, this parameter can be decreased in small steps. It should be noted that if the value is set too low, this leads to an increased number of connections to the grid, and thus to increased wear of components.

3 Parameter Settings

3.1 Factory Defaults for non Country Dependent Parameters

3.1.1 Sunny Boy 8000TLUS

Name	Unit	Range	Default
CO2-Fact	lbs/kWh	0 ... 2	1.7
E_Total	kWh	0 ... 200000	0
Fan-Test		1 / 0	0
Memory Function		no function, Default param., Reset Op.Data, Reset errors	no function
Operating Mode		MPP-Operation, Turbine, V-const, Stop	MPP
Plimit	W	8100 ... 8100	8100
Pmax	W	0 ... 8100	8100
Riso-Min	kOhm	400 ... 10000	400
SMA-SN			
Software-BFR			
T-Start	s	5 ... 1600	10
T-Stop	s	1 ... 3600	2
V-Const Setval	V	300 ... 500	480
Vac-Min-Fast	%	0 ... 50	50
Vac-Max-Fast	%	0 ... 20	20
Vac-Min-Recnct	%	0 ... 50	11.7
Vac-Max-Recnct	%	0 ... 20	5.83
Vpv-Start	V	300 ... 600	360

3.1.2 Sunny Boy 9000TLUS

Name	Unit	Range	Default
CO2-Fact	lbs/kWh	0 ... 2	1.7
E_Total	kWh	0 ... 200000	0
Fan-Test		1 / 0	0
Memory Function		no function, Default param., Reset Op.Data, Reset errors	no function
Operating Mode		MPP-Operation, Turbine, V-const, Stop	MPP
Plimit	W	9100 ... 9100	9100
Pmax	W	0 ... 9100	9100
Riso-Min	kOhm	400 ... 10000	400
SMA-SN			
Software-BFR			
T-Start	s	5 ... 1600	10
T-Stop	s	1 ... 3600	2
V-Const Setval	V	300 ... 500	480
Vac-Min-Fast	%	0 ... 50	50
Vac-Max-Fast	%	0 ... 20	20
Vac-Min-Recnct	%	0 ... 50	11.7
Vac-Max-Recnct	%	0 ... 20	5.83
Vpv-Start	V	300 ... 600	360

3.1.3 Sunny Boy 10000TLUS

Name	Unit	Range	Default
CO2-Fact	lbs/kWh	0 ... 2	1.7
E_Total	kWh	0 ... 200000	0
Fan-Test		1 / 0	0
Memory Function		no function, Default param., Reset Op.Data, Reset errors	no function
Operating Mode		MPP-Operation, Turbine, V-const, Stop	MPP
Plimit	W	10100 ... 10100	10100
Pmax	W	0 ... 10100	10100
Riso-Min	kOhm	400 ... 10000	400
SMA-SN			
Software-BFR			
T-Start	s	5 ... 1600	10
T-Stop	s	1 ... 3600	2
V-Const Setval	V	300 ... 500	480
Vac-Min-Fast	%	0 ... 50	50
Vac-Max-Fast	%	0 ... 20	20
Vac-Min-Recnct	%	0 ... 50	11.7
Vac-Max-Recnct	%	0 ... 20	5.83
Vpv-Start	V	300 ... 600	360

3.2 Country Specific Grid Settings

Name	Unit	Range	Default
Default		USA/UL1741/ 2005, OFF_Grid, NON IEEE1547	USA/UL1741/ 2005
Fac-delta-	Hz	0.2 ... 3	0.69
Fac-delta+	Hz	0 ... 4.5	0.49
Fac-MinTripTime	s	0.16 ... 300	0.16
Vac-Max	%	0 ... 20	10
Vac-Min	%	0 ... 50	12
Vac-Max-Recnct	%	0 ... 20	5.83
Vac-Min-Recnct	%	0 ... 50	11.7

4 Contact

If you have technical problems concerning our products, contact our Serviceline. We need the following information in order to provide you with the necessary assistance:

- Inverter type
- Inverter serial number
- Type and number of modules connected
- Inverter's blink code or display
- Type of communication, if applicable

SMA America, Incorporated

4031 Alvis Court

Rocklin, CA 95677, USA

Tel. +1 916 625 0870

Fax +1 916 625 0871

Service@SMA-America.com

www.SMA-America.com

SMA America Production, LLC

www.SMA-America.com

